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ABSTRACT: The EULEB-Project is intended to supply information to architects and engineers throughout Europe and beyond it. Within the EU it will support the new Energy Directive on Buildings through providing design and engineering details of European public high quality buildings with low energy consumption. By providing a CD containing information on architecture, energy consumption and economical efficiency as well as the comfort of these innovative buildings in use, the lack of information on low energy architecture and the prejudices many people have against it shall be eliminated. A data base of 25 high quality non-industrial, non- residential buildings will be created. The data base will be available through web and distributed also with a CD. The data base will be provide detailed concrete information on the significant parameters of exemplary buildings in the EU and the experiences in use.
The CD will be distributed by magazines and seminars.
The Buildings consist of Educational buildings, Office buildings and Leisure Facilities in nine European countries. Thus different climatic zones from Scandinavia to Greece will be considered and lead to different backgrounds when evaluating the respective buildings. Besides the energy performance of the buildings, the user acceptance will be evaluated by using post occupancy studies.

INTRODUCTION

This project is intended to supply information to architects and engineers throughout Europe to support the Energy Directive on Buildings through providing design and engineering details of high quality, low energy consumption public buildings throughout the EU.

By supplying information on architecture, energy consumption, economical and ecological efficiency as well as the comfort of these innovative buildings in use, the lack of information on low energy architecture should be diffused.

OBJECTIVES

The objective of this project is the creation of a CD, providing detailed and concrete information on the significant parameters of exemplary buildings in the EU and the experiences in use low energy technologies. The CD will be disseminated by magazines and seminars.

The target groups are the main market actors like public clients, investors, and building industry as well as architects and engineers with their local, national and european organisations. The public building types chosen are:

- Local Government Office Buildings

- Educational Buildings (kindergartens, schools, universities, libraries)
- Leisure facilities (museums, sports halls, theatres etc)

Buildings will be chosen in each of the above categories from the participating countries which in population term cover a large majority of the EU even after enlargement (UK, France, Germany, Italy and Spain). In total this means about 24 buildings. The criteria for choice of the buildings is:

- Good Design, preferably award winning buildings
- Low Energy Consumption
- Advanced solutions for architecture, room comfort and technology
- Different climatic zones in Europe (south, middle, north)
- Availability of monitored energy consumption or easily measurable
- Availability of financial data relating to energy saving features (RUE and RES)

The mode of presentation of the information will be through a web based CD which will be distributed as inserts in architectural and/or engineering magazines in the various countries. Interviews with building-users will show the acceptance and the resulting comfort for the people in innovative buildings.

The format will be navigable through either the individual project or through the particular technology. It will therefore include:

- Plans/Sections and Photographs of Building
- Details of technologies include diagrams of principle of operation and photographs.
- Energy Savings associated with technologies
- Room comfort
- Cost/Benefit analysis of technologies
- Video-clips about the buildings
- The CD will therefore encompass:
- Architectural Design Aspects
- Energy Savings
- Economics
- Social aspects
- Climatic data.

The CD will be offered in English, French, German, Italian and Spanish to offer the information easy understandable to a large number of European people.

BUILDING IDENTIFICATION

Low energy architecture always has to be specific to local and national boundary conditions. That requires to point out the national differences in ideas, arguments and experiences for different problems solved with low energy architecture. The national differences are not seen as a barrier but as a challenge that will enrich the project results.

Due to the different use and climatic zone, each of those building types has special demands, qualities and characteristics concerning their energy demands and the demand on indoor climate to provide thermal and light comfort. Therefore, a wide range of technologies and solution that are used to meet the specific needs and to reduce the energy consumption will be found. Furthermore, these buildings are of high architectural quality, of high public interest and are well known. Preferably buildings with awards will be selected. The projects will be representative for typical climatic zones in Europe (south, middle, north) and the related architecture and technologies in the countries. Therefore projects from additional countries to those of the consortium partners will be included (South: Italy, Spain, Malta, Greece etc..

Middle: UK, France, Germany, etc. North: Finland, Sweden etc.).

All identified buildings are judged according to their architectural design, overall energy savings (heating. ventilating, cooling, lighting) and economical and social aspects. The energy consumption will be on a very low level, compared to the building standards of the climatic zones and countries. Preferable, advanced technologies for energy saving will be implemented that are not yet a standard, like: new insulation-, glazing-, heat storing-, and building technologies. New solutions for natural ventilation and daylighting, passive solar heating and cooling. Building integrated services like heated and chilled floors, ceilings. Decentralized and facade integrated services. Renewable energy utilisation and integration (solar thermal, PV, biomass, geothermal etc). Intelligent control and energy management.

The data base will include the following building types:

- Public and Private Office Buildings
- Schools
- University buildings
- Libraries
- Museums
- Leisure facilities such as sports halls and theatres

The criteria of the buildings are:

- Good Design (many award winning buildings)
- Low Energy Consumption
- Good indoor environment
- Advanced solutions for architecture, room comfort and technology
- Different climatic zones in Europe (south, middle, north)
- Monitored energy consumption
- Monitored indoor environment
- Economical information related to energy efficiency (RUE and RES)

The contents of the data base

- Plans/Sections and Photographs of Building
- Details of technologies include diagrams of principle of operation and photographs
- Energy conservation associated with technologies
- Indoor environment quality
- Cost/benefit analysis of applied technologies
- Video-clips about the buildings
- Climatic data
- Architectural Design Aspects
- Energy Savings
- Economics
- Social aspects

The monitored data concerning overall energy demand of the building for heating, ventilating, cooling are collected in the CD. The financial data related to energy savings are collected and processed towards cost/benefit analysis that shows the efficiency of the systems and features.

Videos

For each building, video clips will be created.
To give an insight on how people feel and work in a particular building will be recorded. The clips will also illustrate architecture and the energy saving features. Energy saving features can be shown and explained in action. Especially for users of the CD that are not experts in building and energy saving methods the videos provide a better understanding.

As the daylight situation in public buildings represent an important criterion on building comfort and the quality of the building, measurements of luminances and illuminances of typical surfaces is represented.

Few building examples

SOLAR ENERGY RESEARCH INSTITUTE, FREIBURG, GERMANY

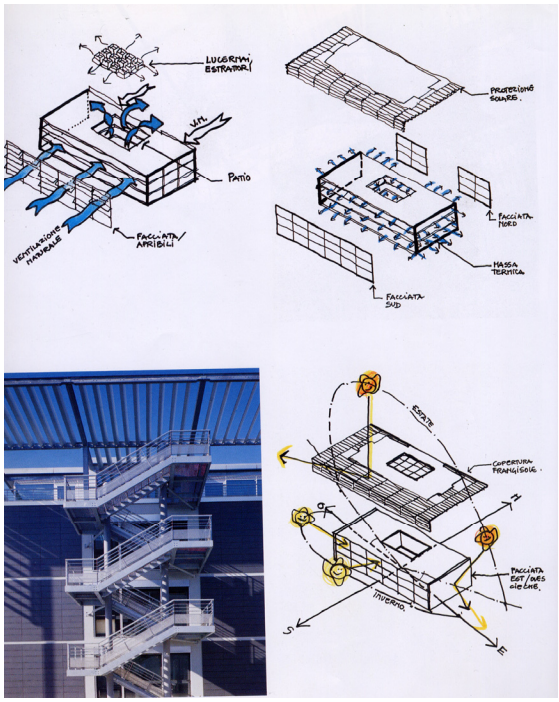
The new building site of Fraunhofer ISE is situated on federally owned property on the north-west edge of Freiburg´s city centre.
The urban surroundings of this area are very heterogeneous, and therefore the new building provides a central town planning function. The building site is narrow and stretches in the north/south direction. A major emphasis in the planning was to create a high-quality working environment with low energy consumption and a high architectural quality.
The combined heating, power and cooling system on the basis of a gas fuelled cogeneration unit is the logical solution for meeting the large demand for electrical process energy and cooling. Solar energy systems on the building shell are used in conjunction with this system to supply electricity and heat.

Features (extract):

- CHP plant (Gas) incl. absorption cooling system
- PV & solar thermal
- -28% WSVO'95
- Mechanical ventilation
- Night ventilation
- Ground heat exchange
- Heat recovery
- Daylighting concept

GUZZINI HEADQUARTERS IN RECANATI, ITALY

The new building that Mario Cucinella Architects (MCA Paris) have designed for I Guzzini Illuminazione headquarters, Company in Recanati, is an example of an innovative office building where reduction of energy consumption and environmental quality have been considered throughout the design process. The central atrium brings natural light into the center of the building and allows the office to be naturally ventilated. The building, with the atrium included, meets the market standards for office buildings, and the useful surface area represents the 83% of the total surface area. On the top of the atrium, that contains also an internal garden, there are positioned twelve skylights designed in view of a natural ventilation system and a daylighting strategy. Project: Cucinella Associates



PRIMARY AND NURSERY, EMPOLI, ITALY

In the 2000 was built the new extension of the primary school building in Empoli.

It has realized adopting strategies of energy efficiency, the semicircular planimetry distribution allows a good sun insulation of the building especially during the winter season. Classroom are south oriented to guarantee a good sun radiation.

The North side of the building accommodates distributions parts and corridors and technical services.
With the energy system adopted the school have reached good comfort levels in particular thermoigrometric and ambient well-being:
- Ventilated
- Wall insulation
- Intelligent windows
- Natural ventilation
- Greenhouse

Project: MSA Associati

OFFICE BUILDING COMPLEX IN POLYDROSOS, ATHENS, GREECE

Three office buildings have been designed around a central courtyard, which is dominated by a pond, wooden decks, sculpture and mature olive trees. One of the buildings houses the offices of the architects in 1000 m2, providing for about 50-60 workstations.

For reasons of bioclimatic design, the building is narrow and long (approx. 8 x 35 metres) and its interior space is entirely open and developed on split-level decks with large voids between them. All workstations are adequately daylight by side windows and skylights. Natural ventilation and cooling is achieved by cross-ventilation and automatically controlled ceiling fans, as well as night ventilation through two extractor fans on the roof. Architects: A. N. Tombazis and Associates, Athens, Greece.

RESULTS

The target groups for the EULEB results are the main market actors like public clients, investors, and building industry as well as architects and engineers with their local, national and European organisations.

Due to the fact that the dissemination activities vary in time and type, three types of activities are described.

The direct outcome of the project is a CD containing significant information on the benefit of low energy architecture and prove the economical and ecological usefulness of existing innovative buildings. The CD will be easy and comfortable to use by navigation through either the individual project or through the particular technology.

This will help to reduce energy consumption in buildings, which e.g. in Germany amounts around 30 % of total energy consumption. It is absolutely necessary to tap this potential to achieve the national aims in CO2-reduction and hereby to fulfil the objectives of the Kyoto protocol and avoid further global warming.

Innovative building concepts for different climatic regions in Europe mostly imply a precise examination of the resulting comfort. By the results of this project it will be shown, that this leads to high quality buildings that give a maximum of comfort to the users.

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Partners of the EULEB project:

Universität Dortmund, Lehrstuhl für Klimagerechte Architektur, Germany
London Metropolitan University, LEARN,UK
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